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I. OPERATIVE TREATMENT OF HIP-DISEASE.

II. REST AND FIXATION IN JOINT-DISEASE.

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THE OPERATIVE TREATMENT OF HIP DISEASE.

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I TRUST that it will not be inferred from the title of this paper that I look upon the operative treatment of hip disease as the chief element in the management of this affection; on the contrary, I regard mechanical and hygienic measures as of the greatest importance, and acknowledge that operative procedures are, like amputations, confessions of defeat.

Yet operative measures are necessary in a considerable number of cases, and as this portion of the discussion has been assigned to me for consideration, I shall endeavor to deal with it alone. The other varying aspects of this disease will be presented by other surgeons, since it would be impossible in any one article, outside of an exhaustive treatise, to deal with this subject in all its bearings.

It may, perhaps, be very justly claimed that there are two classes of orthopedic surgeons; the one, viewing apparatus alone as the chief element in the cure of malformations and of deformities; the other class regarding orthopedic surgery as a branch of general surgery demanding the highest degree of general surgical knowledge and skill, yet insisting, in addition, that mechanical measures and the various forms of apparatus, both before and after operation, are of just as much importance as is a splint after the reduction of a fracture, the necessary reduction and adjustment of the fragments being but a small part of the cure.

Relapses and poor results will occur in the hands of the most careful orthopedic surgeons from neglect and ignorance on the part of the patient, but the worst and most frequent failures are found in the cases where the surgeon, by his words and acts, gives rise to the assumption that he has cured the disease by operation alone. I

acknowledge that my predilection and surgical training render me partial to the speedy results of the knife; yet I value in the highest degree mechanical measures both before and after operation.

A wise decision as to the class of hip cases requiring operative means is an exceedingly important one. I must confess that I am often puzzled in regard to fixing an absolute line beyond which it becomes imperative to interfere. I should be exceedingly glad if this American Orthopedic Association could agree upon absolute rules in regard to cases that should, or should not, receive operation; but from my knowledge of the practice and teaching of the several members composing this important body, I am sure that there would be great diversity of ideas and of practice. Of course, there is a class of cases concerning which there is practically no question as to the justifiability of interference, although some surgeons contend that excision is useless in this late stage, and that drainage alone is then helpful. This class includes cases in the third stage, with multiple sinuses pouring out unhealthy pus, which drain is rapidly exhausting the patient and threatening dissolution. Other cases demanding interference are those showing undoubted evidences of extensive disintegration of tissue with great flexion and adduction; as, also, those extremely painful cases of *caries sicca*, where, without suppuration, the patient sinks and all forms of mechanical treatment fail to give relief. Albuminuric cases also, and those showing evidences of waxy changes can often be benefited by removal: but all these cases have for years been looked upon as at least justifiable ones for operation.

With increased knowledge, and especially with increased facilities for operation due to the greatly diminished risk in antisepsis, we ought to advance our lines and rescue a larger number from the tedious delay and crippling results which are so common in this disease. These cases deserve at our hands the most careful attention that care and skill can give them, and American surgery, quick to embrace successful practice, no matter from whence it is originated, should give no uncertain sound.

As to the necessity of operation, much will depend upon the condition and surroundings of the patient. It is very justly claimed that in many cases operative means are unnecessary, and there are many surgeons who hold that excision is never necessary. Person-

ally, I can say, as regards the value of careful attention and strict mechanical control that I consider them so valuable that I have never excised a hip-joint in private practice where the individual has been under my care from the inception of the disease. I believe that it is very rarely required under such circumstances, but there come to all of us a great mass of cases with hips riddled with sinuses, pouring out quantities of pus, whom we cannot retain under our care with any certainty that a single instruction will be thoroughly followed, but with the almost absolute certainty that the disease will rapidly progress or that death will follow. This class of cases stands upon an entirely different basis, and must be treated in the way that will give the best results in the shortest time, and we cannot hope to accomplish even that little unless they are received into the wards of a hospital. Instructions that are disobeyed, apparatus that is misapplied, can never give good results.

Before operating it is important that we consider three questions :

1. Is life saved ?
2. Is time gained ?
3. Is the resulting limb more useful ?

I. Is life saved ? To answer this question properly would require, first, a careful study of what may be called the natural death-rate from hip disease practically untreated, and secondly, when carefully treated with the utmost attention to every detail and by various forms of mechanical appliances. It is exceedingly difficult to classify statistics upon this point, because there are only a few cases in which a certain form of treatment is not instituted, and secondly, even with apparatus there is the greatest diversity of methods. In the large majority of cases treatment is interrupted by the patient being placed in the care of some other physician, and thus the course of the case in its entirety is lost, and it becomes valueless as regards statistical importance. This is true more frequently as regards hip disease than of other conditions, for the reason that treatment of these cases extends over several years, and there is, therefore, greater opportunity for such change.

Judging from Thomas's statements, we would consider that all cases, even suppurative ones, are curable without deformity, while Hueter takes the gloomy view that only fifty per cent. of suppurative

eases, with flexion, adduction and internal rotation, heal; in fact, he looks upon tuberculous suppurative cases as practically hopeless.

Gibney, in eighty cured cases found that forty-eight at least had had abscesses. Yale gives the death-rate of conservatively treated cases, without operation, as thirty-one per cent.; Gibney, twelve per cent.; Clinical Society of London, thirty-three per cent.; Taylor, two and one-half per cent.—the latter all in private practice.

My own estimate of the natural death-rate in this country would certainly not fix it above fifteen to twenty per cent., while in private practice the result would be far below this figure.

The death-rate from excision, like that of the normal death-rate referred to, varies exceedingly and gives rise to as great a diversity of opinion. Leisrinks gives sixty-three per cent.; Sayre, thirty-four; Culbertson, forty-one per cent.; London Clinical Society Report, thirty-seven; Caumont, before the use of antisepsis, sixty-six, after its introduction, forty-one (eleven per cent. died from the operation). Wright, out of 1700 collected cases makes it thirty-three per cent., which seems a fair deduction.

The saving of life is, of course, the most important consideration of the surgeon, but if the question were to be considered from this standpoint alone, we should at once join the ranks of those who advise early excision, since the risk from operation at that stage would not be great, and in many cases of tubercular affection death would be avoided. Carrying out this line of reasoning, we should arrive at the *reductio ad absurdum* that all cases of hip inflammation should be excised so early that there would be no possibility of there being any other than a local difficulty.

It would be obviously unfair, however, to compare the results of excision with the results of all classes of cases dying from what may be called the natural results of hip disease, since operative cases, as a rule, are selected from the very worst. The only just method of comparison would be to compare 1000 cases of excision with 1000 equally serious ones which did not receive operative treatment. Could such a comparison be instituted, I believe that the operative course of treatment would yield a less percentage of deaths than the more conservative plan, while at present it occupies a higher place. Were we to compare early resection with similar cases where rigid rest has been secured to the articulation during treatment, doubtless

lives would be saved and time gained by the former plan ; but as regards locomotive powers the balance would be in favor of rest.

Wright states (*British Medical Journal*, December 15, 1888) that incision has not given him any better results than excision ; consequently we may for the present line of argument practically consider them as one operation.

But even if the saving of life is the prime consideration, other objects must not be overlooked. A large percentage of operative cases die from lardaceous degeneration, or exhaustion from suppuration, or from tuberculous conditions ; few from the operation itself.

II. Is time gained ? With the practice of antisepsis, which favors rapid healing, we frequently obtain speedy closure of the wound. If any one wishes to have excellent statistics let him report all cases about the sixth week "perfectly cured." But wait a few weeks more ; a small sinus appears, a long period of suppuration follows, and the patient either finally dies, or is cured at the end of possibly a little shorter period of time than would have been occupied by a natural cure, but the limb is less useful as a walking member. Even Croft, who favors early excision, acknowledges that the majority of his cases require close watching from one to two years after excision, one-half of them two years, and that ultimate suppuration is very likely to appear.

The cases reported within a few weeks, or even a few months, after the operation, are not relapses. The disease has continued uninterruptedly in spite of operation ; but, as in non-operative cases, the pus has been slow in coming to the surface. True relapses are so common in apparently cured cases as to warn us against too great enthusiasm. I am at the present time treating five cases of relapsed hip disease that have returned after forty-five, nineteen, sixteen, ten, and six years respectively. In removal of diseased bone tissue, either by excision or by erosion, the underlying layer of bone cells is necessarily injured, and the inflammation thus set up causes caries, with opening of the sinuses and suppuration for a certain period of time. To minimize this element of failure the scoop should be very sharp, and all fragments could be washed out immediately.

III. Is the limb after excision as useful as the one which nature, assisted by the surgeon's care, is capable of securing ? In the large majority of cases unquestionably No. The loss of the bone, even

in one of the worst cases of disintegration of tissue, is seldom as great as in complete excision where the trochanter major is sacrificed. Even in suppurative cases, where there has been absolutely no operative interference, where the joint has been thoroughly fixed, and ankylosis has been secured, the result is an excellent walking member, and the vertebral column (especially in a child) gives wonderful compensatory movements. For the working man or woman a stiff joint is incomprehensibly better than one in which the pelvis is insecurely steadied upon the femur, while extensive resection in early childhood may by the removal of the epiphysis so interfere with the growth of the member that the limb may be rendered almost useless as a functioning part of the body. The report of the London Clinical Society was decidedly of the opinion that the result was less useful, and I must confess that my results after excision have not been satisfactory; even when treated with care, with rigid antisepsis, and with subsequent attention to fixation of the joint for one or two years, a large majority of cases, six months after leaving the hospital, have been found to be suppurating. I speak of hospital cases, as, under proper care, operation is seldom necessitated in private practice.

It is sometimes argued that the most direful results obtained are those seen in the hands of the best hospital surgeons, which is undoubtedly true, from the fact that hospitals receive the very worst class of cases. Frequently the case when brought to the institution is already in the advanced stage of suppuration, with involvement of both femur and innominate. Few dispensary out-patients can receive the close attention that is so essential in the cure, and without it even well-ordered measures will fail for want of attention to detail at the hands of ignorant mothers.

Yet, looking at hip disease in the light of present pathological knowledge as a local bone tuberculosis, the most rational theoretical method is to rid ourselves of the dangerous material, if possible, before the general system becomes infected. Is it possible to do this? In the present state of our knowledge we must frankly answer, we do not know. First, because we cannot be certain as to the exact number of foci that exist, and, secondly, we cannot fix the time at which general infection commences. We know that the most common point

is near the epiphyseal line, but as to the rapidity of either local or systemic infection we have no certain knowledge.

The fact that pus has formed and has escaped from the capsule is sufficient cause for grave apprehension as to the result. But what course are we to pursue as to its removal? Although correct in theory, I am not prepared to advocate what is known as early excision. I abhor retained pus, and yet, I have before my mind too many cases like the following:

A., aged eleven, female, with long, unmistakable signs of hip disease passing through its various stages; abscess tumor appeared on the front of the thigh; by aspirations, in each of which operations sero-purulent material was abstracted, and by the employment of rest the symptoms became quiet, and the case cured without pus appearing at least on the surface. She has now been walking about in perfect health for eight years.

C, a case in which localized swelling was so great that I was called in consultation to open the abscess; undoubtedly hip disease in acute stage, but which, under proper treatment, after eighteen months shows no signs of suppuration, and bids fair to recover without loss of joint motion.

Such cases cause one to hesitate when the symptoms are not very serious, and the surgeon in all these doubtful cases should go carefully over the whole ground, taking into consideration, in connection with the local symptoms, the surroundings of the patient, the general condition of health, and the ravages of the disease up to the present time.

On the other hand, I can recall many cases which were making favorable progress, and yet suppuration has suddenly appeared, and the patient has died from long-continued drain, or from lardaceous degeneration, or from tuberculosis. Others, where operation has been refused, have taken the same course. In cases where there are reasonable signs of pus formation, and yet where the existence of abscess is not positive, even though thickening and induration are markedly present, we can often afford to wait until the diagnosis is more thoroughly established, feeling confident that injury to the general health will seldom result.

Incision, erosion, and drainage, as described in a later portion of this paper, sometimes offer better hope of relief than excision, on

account of the thorough removal of all portions of the tuberculous material, both of hard and soft parts; but I have not practised this plan of complete removal for a sufficient time to speak emphatically in regard to its value, as it will require several hundred cases to yield reliable results. In theory it is correct, and it has given excellent results. I cannot boast of such brilliant successes as have been reported by Barker (*Brit. Med. Journ.*, Dec. 15, 1888, p. 1336). yet a close examination reveals the fact that his cases, months later, showed evidence of a continuation of the disease, even though prompt healing had taken place.

I look upon all pus confined in the body as an element of danger, and upon tuberculous material as especially fraught with risk. I do not overlook the fact that our very efforts at removal of this tuberculous material may be the means of causing bacillary infection, and that we may hasten general tuberculosis. It is on this account that I advise the letting alone of the abscess unless thorough removal is decided upon. Partial removal is dangerous. Neither do I overlook the fact that encapsulation, caseation, absorption, or organization of the tuberculous foci may occur. Yet, on the other hand, such foci may be a menace to the constitution for many years.

The worst argument against thorough removal and rigid extirpation of the diseased tissue is the fact that Volkmann, who followed this plan for some years, was disappointed in the results. After reëxamination of his cases he found that relapses were not uncommon. In this respect he seems to have had similar results to those secured by the rest of us.

The principal measures practised for the relief of the various stages of hip disease are:

- I. Aspiration of the fluid in the joint.
- II. Ignipuncture.
- III. Trephining or drilling.
- IV. Aspiration of abscesses more or less remote from the joint.
- V. Incision of the abscess.
- VI. Incision, crasion, and drainage.
- VII. Excision.
- VIII. Amputation.
- IX. Osteotomy.

I. *Aspiration of Joint Fluid*.—While thoroughly of the belief that the overwhelming majority of cases of chronic hip disease are evidences of tubercular osteitis, caused by slight injury, there are a certain number of instances of primary joint inflammation that require treatment in order to prevent the degeneration from involving the bone structure and then becoming tuberculous. The surgeon who does not treat cases that are diagnosed as “contusion of the hip” with this possibility in view, is not only reprehensible for short-sightedness, but is committing a crime against his patient. The progress of the majority of these cases is hopeful. Distention of the joint by serum will necessarily produce flexion, abduction, and external rotation; and to employ traction in a straight line, without the removal of the fluid, provokes muscular spasms and produces pain. If the removal of the fluid is contraindicated or declined, traction and fixation in the line of the deformity are permissible. Should rest, or traction, or both, produce no relief within a few days, then, with a clean instrument, clean hands, and clean integument, no harm can result from aspiration. When there are evidences of increased thickening about the joint, indicating that the fluid has degenerated into pus, removal of the articular contents is advisable: the joint may be reached posteriorly or anteriorly. I prefer the former route, but am guided by the nearness of the swelling to the surface. The amount of the fluid is limited unless the capsule is ruptured. Great benefit will ensue provided rest of the joint follows, and instructions are strictly followed for a long time after all apparent symptoms have passed away.

II. *Ignipuncture*.—This, as practised by Park, Bradford, and others, consists of electrical tunnelling of the bone, or cautery by electricity. It is occasionally valuable, and would often be of more service if we could be assured of the correct situation of the tuberculous focus. Uncertainty upon this point, however, will, for the present at least, permit it to be only occasionally employed. The puncture is usually made over the trochanter, and the cautery is caused to enter the longitudinal axis of the neck of the bone until the epiphyseal juncture is reached. Good drainage is thereby secured. If all bacilli could be destroyed a rapid cure would result.

It will require further tests before it is recognized as an established procedure.

The actual cautery may sometimes, I suspect, in the olden time

have been buried in the bone by Pott, Brodie, and others. This method, which we now so greatly decry, secured to the patient a long period of enforced rest from which benefit was derived, and thus the agent actually became a large factor in the cure.

III. *Trephining and Drilling*.—From this plan of operation much benefit doubtless would be obtained if, as in the last-mentioned plan, we could locate the exact position of the tuberculous focus. Unfortunately, however, this is usually impossible. Lovett states that much relief can be obtained by the evacuation of the products of inflammation by this method. He cut a quarter-inch hole through the neck of the femur with a trephine, and curetted and drained thoroughly from the bottom of the cavity. The temperature in his case ran up to 104.5° , but he states that cure was facilitated. It seems to me that cases requiring ignipuncture and trephining would be better treated by exploratory incision, followed by erosion or excision.

IV. *Aspiration of the Abscess*.—As long as there is the slightest doubt as to the existence of pus we can well afford to delay, even though confined pus is an element of danger. Many surgeons advocate the plan of letting these abscesses absolutely alone, as statistics prove that the danger to the constitution is not thereby greatly increased.

An important element in the diagnosis is the use of the aspirator. Thorough antisepsis must be employed, and it must be certain that no element of suppuration is introduced by the operator. A needle of large size should be employed, and if the fluid secured is sero-purulent in its character, or if we have the liquefaction of caseation, I have found that it is wiser to continue this plan of operative procedure as rapidly as the abscess becomes filled. In many cases absorption or organization has occurred, and the case has gone on to excellent cure without any pus finding its way to the surface, although the use of the aspirator is usually rejected by surgeons. When the instrument reveals true pus one of the following plans of treatment must be instituted, unless we decide upon the let-alone policy. If it is decided simply to evacuate the pus without any more thorough operation, I prefer the preliminary plan of drawing it off through a large aspirator, and injecting into the cavity of the abscess ten or fifteen grains of iodoform dissolved in glycerine and

distilled water. This should be allowed to remain, the object being to excite just sufficient inflammation to strengthen and thicken the walls of the abscess, which is nature's method of protecting the system from injurious invasion. This strengthening of the sac is the sole object for which I employ this plan of treatment.

V. *Simple Incision of Abscess.*—When pus is absolutely proven to be present the question of its evacuation becomes an important one. This has already been discussed by another member of the Association, and I will not delay you further than to cite my individual plan in dealing with these abscesses. As a rule, I prefer to abstain from any interference until I am positive as to my plan of final action, or until the consent of the patient has been secured to the necessary operative procedure. Should the major operation be declined, or if there are any contra-indicating symptoms, simple incision and drainage are most desirable under strict antiseptic precautions. I have already described how preliminary aspiration should be performed in order to diminish the risk from bacillary infection through the walls. The incision should be made at the point of the tumor which will give the greatest drainage. Frequently it is desirable to make two openings, so that "through and through" drainage may be secured. In all cases of simple incision of abscesses it is my chief object to avoid any pressure upon the abscess wall lest fissure occur, and bacillary infection follow through this route. The contents of the abscess should never be pressed out, but should be removed by a gentle current of hot sublimate solution until the major portion of the contents has been evacuated. A bulky antiseptic dressing should be applied without undue pressure, and should be allowed to remain until signs of decomposition appear, be it days or weeks. Disturbance of an abscess is as injurious as is the opening of a fresh wound. A drainage-tube should be inserted at the time of the operation, but should be slowly withdrawn day by day. Subsequently antiseptic washing may be practised according to the view of the operator. So long as there is no pocketing of the pus I prefer to let it escape by free drainage rather than by forcible pressure.

VI. *Exploratory Incision, Erosion and Drainage.*—There is no special form of incision which should be followed, even when it is possible that the operation will end in excision. If the abscess has not yet opened, the most dependent portion of the prominence should

be selected, avoiding the large vessels and nerves, and also paying attention to the integrity of the muscular fibres as far as possible. If sinuses exist, two or more of them may be connected, or the more prominent ones may be followed to the diseased bone. The bleeding vessels should be secured and irrigation by hot sublimate solution (1 to 1000) be instituted so as to form a protective layer of coagulated albumen upon the freshly cut surface, thus assisting in the prevention of tuberculous infection. Thorough exploration by the finger and probe will then disclose the origin of the pus. It is possible that the joint will be found open; if so, no harm will arise from enlarging the wound sufficiently to admit the finger, and thus determining whether the disease is limited to a small area. The scoop is now brought into use and every particle of diseased tissue that can be reached either in the head or neck, or synovial membrane, or in the acetabulum, or soft surrounding tissues, is cut away. For this purpose I prefer the hollow-handled sharp spoon here shown, as it enables me to work more rapidly, and at the same time it supplies a constant current of water, and thus destroys all germs before they have an opportunity to



infect the incision. It is simply a sharp Volkmann spoon with a bulky handle tunnelled longitudinally with a large bore so as to allow free ingress of water from the feeding rubber tube, which is connected with a reservoir, or jar, or rubber bag. The device of Barker's for shutting off the flow of water is entirely unnecessary, and is cleansed with difficulty. The carpal portion of the operator's hand makes an efficient valve and is easily employed for the arrest of the current when necessary. The length of the tube and the height of the jar, or fountain syringe, must be varied according to the rapidity of the flow desired. This hollow instrument gives the operator control of the current and leaves him free from the presence of an assistant's hands. The bore should be $\frac{3}{16}$ inch.

The erosion must be carried well beyond the seat of the disease, and for this purpose a curved gouge is sometimes necessary. If the head or other portion of the bone is loose the rough ends must be

sawed off or gnawed by strong rongeurs, and all fresh foci discovered in the bone similarly treated. The knife and scissors are then brought into use, and all possible fragments of the diseased tissue entirely cut away. All sinuses should be opened if possible, and the entire walls, together with those of all abscess cavities, should be removed until healthy tissues are reached. After rendering the wound thoroughly aseptic, we may permit it to fill with fresh blood-clot for organization; the wound can be closed dry with catgut or rubber drainage according to the judgment of the operator. In the majority of cases I regard it as far more important to effect a thorough cure than to secure primary union. Rubber drainage is, therefore, preferable, especially when there has been extensive bone disease, as it counteracts any error that is liable to occur even with the most careful antisepsis. If these tubes are withdrawn a half-inch at every dressing, it will accelerate the healing and will lead the pus down their track. They are usually too long retained. A large antiseptic dressing should be immediately applied, firm pressure being made over antiseptic wool.

In the discussion upon this method which developed in the Royal Medical and Chirurgical Society (*British Medical Journal*, December 15, 1888) absolute antisepsis, subsequent attention, and absolute rest were insisted upon. It was shown by Croft that while in 1880 the mortality after excision was thirty-three per cent., it is now diminished by antisepsis to fifteen per cent. The anterior incision of Hueter for erosion was recommended, although thorough removal and drainage was more difficult. Wright, who had excised one hundred and thirty-five times in his last eight hundred cases, thought it impossible to remove all the diseased tissue, and as a single focus remaining might, on slight traumatism, arouse inflammation and bring on a relapse, he still believed in drainage. It is certainly impossible to secure a clean fresh wound in every portion where there has been a large amount of disease and extensive suppuration. The subsequent dressing is by weight extension over a pulley, with perfect rest, good air, and continued fixation.

The temperature chart is the most valuable index of the accumulation of pus, and every rise indicated should be followed by a careful examination of the region. I am still searching for positive rules to guide me in the indications for excision, erosion or drainage, but in

the worst cases, in the freely suppurating ones, and those that are rapidly failing, there can certainly be no question as to the propriety of one of these procedures.

Frequently, when an exploratory incision has been made with the idea of removing the diseased portion by erosion, excision will be the final result of the operation. It is not to be expected that erosion can take the place of excision. It is simply to be employed in cases where the destruction of the bone tissue has been small.

VII. *Excision*.—As the question of excision of the joint will be discussed by another member of this Association, I will not enter into details regarding it. Suffice it to say that when an exploratory incision reveals a large portion of diseased bone, and when it is impossible to remove the foci by erosion, resection should be immediately performed.

Enough has been said, in the earlier portion of this paper, to show that excision should not become a routine practice in bad cases of hip disease, as has become the practice of many surgeons in late years.

Excision is an operation of exceeding great value in well-selected cases, but it should be performed only with the full consideration of all the surroundings of the individual case. As to early excision, reasons for its avoidance have already been given.

As to the line of incision for excision, we may be governed by the location of the sinus, but we should be guided more by an avoidance of the muscular and nerve fibres than by any fixed line, although I prefer the curved incision passing behind the great trochanter from the posterior iliac spine. If the anterior incision is preferred, it may be commenced just below the anterior superior spinous process with the tensor vaginæ femoris and gluteus on the outside and the sartorius and rectus on the inside, cutting directly down in front of the capsule.

It is well to save all healthy periosteum, but this membrane, when diseased, should be thoroughly removed, as should other disintegrated tissue. While excision should be thorough, it is not necessary that the trochanter, when healthy, should be sacrificed merely for the sake of drainage, as we can secure this by carrying a tube directly backward through the buttock, or in any convenient direction.

Retention of the trochanter will add greatly to the future useful-

ness of the limb, as well as in its length. A narrow saw, with a stout handle, similar to that of the Adams saw, but with a longer cutting blade, is usually more convenient than a chain saw. The soft parts can be protected from injury by retractors. For very deep work, where the chain saw is certain to break during an operation, I have had a chain saw made of the size and weight of an ordinary *écraseur*. This is much better fitted for heavy work, but is not equal to the straight saw.

When osteomyelitis is present in the head and shaft of the femur, care must be taken not to strip the periosteum from a larger area of the bone than is necessary in removal. When the disease extends far down the shaft of the femur, the foci can be removed by erosion, especially in cases where to clear away all disease would necessitate the removal of three or four inches. The result of entire removal in such a case would be to leave a "flail" limb, and amputation would be preferable save for appearance. It is best in these cases to perform erosion if a second operation becomes necessary.

The after-dressing which I find most convenient and comfortable, is simply light extension by adhesive strips with cord passing over a pulley, with heavy sand-bags applied to either side of the body from the axillæ to the feet. A wire cuirass is convenient and useful in cases where early transportation is required. The patient rarely suffers much pain.

In excision, as in erosion, all diseased tissue should be cut away and the acetabulum cleaned as freely as possible, the gouge and scoop being brought into use. Drainage should be thorough and complete, but the tube should not be retained any longer than is necessary to form a track for any deleterious material that may remain in the wound. Thorough antisepsis promotes rapid healing, but in excision, as in erosion, any remaining diseased foci will cause subsequent abscess.

When indications of commencing waxy changes make their appearance, excision is certainly desirable in order to check the drain upon the constitution, and with strong hope of arresting the disease. Sometimes, even when these changes are marked, although the immediate risks of the operation are great, yet life has been prolonged by the removal of the diseased foci.

I have recently seen a case where excision has been performed,

yet where suppuration has continued, and gouging had been practised three times upon the patient with the continuance of the suppuration after each operation. The kidneys, liver, and spleen showed most extensive changes, and yet the patient rapidly improved, gained flesh and strength and was nearly freed from the discharge of pus from at least a dozen sinuses by a three months' residence at the seashore. This case evidences the effect which the bodily constitution has upon the inroads of disease, when the system is placed under good resistive influences.

By rapidity of operation; incision of moderate length; sawing the bone with a narrow saw while in position and without much disturbance of the parts; the prompt arrest of hemorrhage by the use of hemostatic forceps, and by extreme care in all the details of the operation, the shock is greatly diminished, and the seriousness of these operations has been greatly lessened in recent years. The condition of the patient has also been greatly benefited by the lessened drain upon his system through thorough antisepsis, and he is thus made better able to cope with the tendency to relapse. The necessity for excision, as for erosion, is greatly diminished by rest and fixation. After the operation no weight should be put upon the limb for many months, and the diseased region should be thoroughly protected from injury by some form of fixation apparatus for at least a year after entire recovery has taken place.

Excision in the later stage will, unfortunately, yield from eight to ten per cent. of deaths within the first three weeks after operation, and fully three-fourths of the cases may be expected to relapse. In probably one-third of the cases improvement is favorable at the beginning, but the return of the disease in the next few months is to be confidently expected.

In cases of great deformity, with marked shortening of the limb, and strong adduction across its fellow, great gain in position may be secured by excision, although if these cases are progressing favorably, even they may be permitted to ankylose, when subsequent osteotomy will bring them into good position. In suppurative cases tubercular infection of the system is to be expected in from five to eight per cent. In non-suppurative cases the percentage is still less.

Croft puts the general mortality of hip disease at thirty and one-half per cent. Although one of the arguments in favor of early

excision is the prevention of tubercular infection, yet as eighteen or nineteen escape this danger in the ordinary course of the disease to one that becomes infected, this one does not justify the deforming results of early operation; especially if, as in the early stage, it is impossible to diagnose the exact number of foci of disease that are present, or that may exist in other portions of the body.

Wright acknowledges that only seventeen per cent. of cases of excision are satisfactory in their results; that twenty-five per cent. were absolute failures, and that nearly sixty per cent. were suppurating a year after operation.

In cases not operated upon, about one-half are suppurative, and fifty per cent. recover without loss of motion.

In eight hundred and thirty-seven cases of excision, ten per cent. of the deaths following operation were from rapid miliary tuberculosis.

In one hundred and forty-four cases Sack gives the death-rate as twenty; thirteen of which were from tuberculosis.

Grosch reports one hundred and sixty-six excisions with thirty-six per cent. of deaths, one-half of which were from tuberculosis.

Croft reports that thirty per cent. of deaths were from tuberculosis. Under antiseptis the death-rate has diminished after excision from thirty-three per cent. to fifteen per cent.

Marsh: In four hundred and one cases of hip diseases treated without operation, thirty-one per cent. died from suppuration. Of suppurative cases twelve per cent. were cured, and of non-suppurative cases sixty-nine per cent. were cured. Of non-suppurative cases ten per cent. died; eight per cent. recovered with useful limbs. Nine per cent. of the deaths were from tuberculosis. Sixty-nine per cent. of cases suppurated, and of these thirty-three per cent. died without operation having been performed. Of the non-suppurative cases only ten per cent. died.

The percentage of deaths in suppurative cases which occurred from albuminuria, waxy changes, and exhaustion, could probably have been saved by early excision.

Marsh: Of six hundred and fourteen cases treated by prolonged rest, the mortality was six per cent., but it is not proper that these cases, which probably were suppurative in a minor degree, should be compared with the twenty per cent. of deaths from excision, as

the circumstances of the class of cases were entirely different. In late excision ten per cent. died, and from twenty per cent. to thirty per cent. showed no improvement.

In the first stage the mortality is, as we know, from six to eight per cent. In the late stage, the suppurative cases with amyloid degeneration, the mortality rises from thirty per cent. to fifty per cent.

In thorough rest the mortality has been reduced in the Alexandra Hospital from thirty per cent. to five per cent. Seventy per cent. recover with slight loss of motion.

VIII. *Amputation*.—While amputation has been very serviceable in joints aside from the hip, yet at this articulation, although sometimes employed, it is rarely of service, since cases necessitating so serious a loss of tissue would probably be accompanied with caries of the ilium, and the removal of the limb would be of only slight service, save in arresting the drain. It has, however, been occasionally performed, and when extensive osteomyelitis involving a large portion of the head of the femur is present, it would be decidedly preferable. Since Ferguson's advocacy of excision in 1850 amputation has decidedly (and properly) fallen into disuse since the more conservative operation is usually of great benefit, and is less fatal.

As excision has lessened the number of amputations, so erosion will, in the future, lessen the number of excisions.

IX. *Osteotomy*.—As osteotomy is only to be practised after thorough consolidation of all the tissues, it need not be considered in the present discussion.

CONCLUSIONS.—1. Mechanical measures, which enforce strict and long-continued rest of the bone, are the best preventatives of operative procedures, and when they can be properly employed, as in private practice, operation is seldom necessary.

2. Antiseptic aspiration of the joint is desirable if it is distended with serum; sometimes when it is filled with pus.

3. Ignipuncture and trephining give great relief provided the focus of the disease is reached.

4. If in doubt as to the presence of pus, employ rest and fixation, and wait; or aspirate antiseptically. Repeat the aspirations if the fluid drawn is sero-purulent, or if the liquefaction of caseation is

present, since organization may occur without the opening of the abscess. If there are no signs of caseation, wait. If caseation takes place, make early exploratory incision, remove, and drain.

5. When certain that true pus has formed, provided drainage alone is decided upon, aspirate and inject with iodoform, in order to strengthen the walls of the abscess cavity, as a preliminary to further operation.

6. If the abscess is to be opened and no further operation performed, incise freely as soon as the sac refills. Wash out the contents with a slow current of 1 : 2000 hot sublimate solution, but on no account employ pressure to expel the pus, lest fissures be produced in the internal wall and infection thus favored. Drain thoroughly, dress antiseptically, and fix the hip. Continue to keep it at rest until closure occurs, or until further steps are necessary.

7. When extirpation has been decided upon, make an exploratory incision either along the line of a sinus or directly upon the bone and thoroughly examine the joint. If the destruction of tissue is small, try erosion and remove the carious bone and other tissues with scoop, scissors, and knife. Endeavor to remove every particle of tuberculous tissue of both hard and soft parts, including abscess and sinus walls. Irrigate thoroughly with strong antiseptics to prevent bacillary infection of the freshly cut tissues, and drain freely. With antiseptics the dangers of opening the joint are but slight, and the desirability of operation is now based upon the question of time and the ultimate results as regards usefulness of the limb.

8. Perform a formal excision, not as a routine practice, but when the disease is found too extensive to be removed in any other way. In desperate cases excision becomes of exceeding value, but should never be adopted as a routine practice. In adults, especially when poor, a typical resection gives the most useful results. As erosion is less mutilatory than an excision, it should be performed provided all tubercular foci can be removed.

9. Always follow operative procedures by most careful attention to rest, fixation, and protection of the joint for months or even years.

II.

REST AND FIXATION IN JOINT DISEASE.

REST AND FIXATION IN JOINT DISEASE.

BY DE FOREST WILLARD, M.D.,

PHILADELPHIA.

MR. H. O. THOMAS, of Liverpool, in his latest fulmination,¹ takes occasion to object to my methods of producing fixation in joint disease. While I as thoroughly believe in the necessity of *rest* as does Mr. Thomas, or any other member of the profession (since it is not only correct in theory, but in practice also it has yielded me the best results), yet I cannot agree with him that it is only to be obtained by the use of the Thomas splint. I believe that rest to a joint can be obtained in a variety of ways, and any plan that will produce this result will give good cures. The means may differ according to the judgment of the surgeon. I am satisfied that excellent results follow the use of the Thomas splint, but I do not think they are caused by this particular form of splint as much as by the long-continued application of the principle of rest for month after month. If I understand his method correctly, his custom is never to allow the removal of the splint during the entire course of the disease. In my opinion it is largely this persistence, combined with the fact that his cases are all in private practice, that secures the excellent results that he reports. I confess that such absolute rest is not obtained in the practice of the majority of American surgeons, since with nearly all of them a certain amount of motion is undoubtedly produced in their efforts to obtain cleanliness. English mothers must be far different from those in our country, if they permit their children to continue for such a length of time without securing for them that condition of cleanliness which is so important to health.

Mr. Thomas asserts, on page 5 of his article above mentioned,

¹ An Argument with the Censor of St. Luke's Hospital, New York. Pamphlet. Liverpool, 1889.

“that every case of hip-joint disease can be cured without leaving a fractional deformity of flexion, and consequently, without any shortening, except that either arising from the arrest of growth, where inflammation has interfered with the growing points in the upper parts of the femur, or from erosion, no matter whether the case goes on to suppuration or not, or is even presented to us for treatment in an advanced stage of suppuration.” If he can prove by statistics that this remarkable statement is true, that *all* cases, *suppurative* or *non-suppurative*, can be thus cured without even a “*fractional deformity of flexion*,” and “*without any shortening*,” then I shall be exceedingly glad to abandon any form or plan of treatment which I have either practised or seen practised in the past. We are accustomed to see some beautiful results in carefully managed cases in private practice, but to obtain such perfect cures in “*every case*” has never been reached.

I do not argue against the Thomas splint; on the contrary, I have used it with good results, and I believe in it because of its fixation powers, but I do not believe that it is the only splint that produces rest. Rest can be secured by traction, by leather appliances, by plaster-of-Paris, by wood, by binder's board, or by any rigid material; even traction splints produce a certain amount of rest. The secret of success, in my opinion, consists in carrying the splint far enough above the hip-joint to produce a certain degree of fixation that will approach most nearly to absolute rest. I do not believe that absolute rest, in its true sense, can be obtained, but we can approximate it. Any splint, therefore, which is intended to secure rest must reach to the thorax above and to the calf below. Upon this condition, rather than upon any particular form of splint, success depends. My objection to all splints that have only pelvic bands, is that the seat of motion is moved upward to a point in the spinal column only a few inches above the diseased region. By transferring it higher to the dorsal portion of the spine a far greater degree of rest is secured at the hip. This is the element which is especially valuable in the posterior bar splint, and is another of the great secrets of its success.

The posterior bar, however, is not as effective for a protection splint as is a modification which I have frequently used, and which adds an additional lateral bar, thus securing protection of the joint against blows, particularly during falls, which must occur with considerable

frequency in all children after they are permitted to go upon crutches.

The other essential element of rest in portable apparatus for hip disease, consists in the use of *axillary crutches*; in fact, were I compelled to be limited to the use of a single item of the many paraphernalia for the treatment of this affection, I should choose the axillary crutches, believing that by their use alone fair results could be obtained. I object to perineal and ischiatic crutches, from the fact that their use brings traumatism, in walking, too close to the seat of the disease. Jarring and concussion are produced at every step, while with axillary crutches and a high shoe on the sound foot, the motion imparted during movement is simply a swinging one. It is with this idea in view that I occasionally try Hutchinson's method among poor patients; not that I consider surgery a "caste art," as Mr. Thomas seems to suppose, but simply because it permits us to give patients a fair degree of treatment without any cost, and, therefore, it is a benefit in cases where nothing better is possible. Very rarely, however, should this plan be employed.

Absolute rest is not secured by the Thomas splint, unless English children are different from our own. With this splint it is impossible for patients to sit with any comfort, except upon a high chair. Children will sit, and in doing so considerable *twisting of the limb upon its long axis*; is the result.

The avoidance of this hip-straining motion first led me to adopt, in certain non-acute cases, a form of splint with unlocking joint, in which the joint was temporarily released when the child sat, flexion being allowed so that sitting became easy, and the patient was made comfortable on an ordinary chair. This splint, which bears my name, is accurately fitted to a plaster cast of the body from the thorax to the leg. The material is partially tanned leather moulded when wet, and dried upon the cast. The truncal section is united with that of the thigh by a joint opposite the hip, which joint can be locked or unlocked as desirable. I acknowledge that this permits temporary motion, but protection of the joint is constant, and the amount of motion is but little; the injury to the joint is less than is the strain caused by the twisting of the joint while wearing a posterior bar. I have the advantage of having given personal supervision to *both* forms of apparatus, and know whereof I speak.

I have never claimed that a splint, which allows even temporary flexion of the hip-joint, is suitable for any other class or cases than those that have passed the acute stage. During the acute and painful stage I consider absolute rest essential, and, by rest, I mean rest in the horizontal position, with support of the limb and body by sand-bags, side splints, posterior splints, or any other form of fixation apparatus that may be selected by the surgeon. In this stage, I know from experience that traction is useful; traction by pulley and weight *in the line of the deformity*. Why Thomas objects to this I cannot imagine. It certainly assists in procuring rest by tiring out and tranquillizing the muscles which have been thrown into a state of reflex spasm by the disease. It is a principle which is well recognized in the whole surgical world; it gives comfort, relief from pain, and greatly shortens the stage of starting pains. I do not believe that it produces any distinct distraction of the joint surfaces, but it does modify their contact, and, as I have stated, is an important element in furnishing rest.

I cannot see any difficulty in the plan (which is so common in this country) of bed extension, where lateral and downward traction are first made so that their combined force is exerted in the line of the deformity, and then altered day by day until a straight position is reached, and I know that it is more comfortable to the patient than is the "lever principle" when it is brought to bear upon the articulation.

While not a believer in the power of a "traction splint" to produce in the erect position any appreciable traction during the *critical moment when the weight of the body is brought upon the perineal straps*, yet even this splint does modify surface contact, and, to a certain extent, protects and gives rest to the inflamed bones. Thus far it does good, and I know that its advocates are honest in their belief of its efficiency, and that they do secure some good results. I believe, however, that they would increase their percentage of satisfactory results if they would study well the less amount of traumatism inflicted, and the greater amount of traction secured by the weight of the protected limb at the moment above mentioned, when axillary crutches are used.

I have learned not to rely upon a single method of treatment, but to secure all the good that can be obtained from any plan of theory

or practice. I am convinced that *rest of the joint* is the positive element in preventing, aborting, and lessening inflammation.

I regret that Mr. Thomas has not been able to understand my expression that "cases of traumatic origin can, within the first ten days, be easily checked."¹ My intention was to emphasize the fact that treatment by rest was far more effective when cases were secured within ten days after traumatism than when it was applied at a later date. My argument was to induce surgeons to apply at once the abortive treatment as soon as muscular rigidity appeared, not to permit the case to go on to a full stage of inflammation while they are endeavoring to form a diagnosis. I argue that the treatment should be commenced immediately upon the first signs of the difficulty, viz., muscular rigidity and slight limp. With so serious a disease we cannot afford to neglect the early indications.

A few sentences in my article should, in my opinion, have made the meaning perfectly clear. "The limb, under no circumstances, should be placed upon the floor, and until pain and all signs of acute inflammation have subsided, the recumbent position should be unceasingly maintained."

Again, on page 5 of the reprint named I distinctly state that "if the case is osseous in its origin, *several months* should elapse *after all cessation of pain* before crutches be permitted," and on page 7, "after all pain has ceased for *months*, some form of apparatus should be applied to prevent joint motion, and yet to permit the patient to move about on crutches, and with a high shoe on the sound foot."

Unless serious complications arise, and if the hygienic surroundings are good, the period of horizontal rest, fixation, and extension may frequently be prolonged with decided benefit. No impairment of health need result in the majority of cases, provided the patient be placed upon a light platform, with mattress and extension apparatus, as advised in my article, since it can thus be easily carried out of doors and placed upon a wheel framework, or on chairs, and thus an abundance of air can be obtained without any disturbance of the joint. Bradford's frame, or a wire cuirass, or a gypsum case, answers a like purpose. Fresh air should always be freely admitted to the room. The instances in which confinement to the bed has

¹ Rest and Fixation in Joint Diseases. New York Med. Journ., Dec. 5, 1885.

been followed by impairment of health are certainly few in comparison with those that have been injured by lack of such treatment. Long immobilization certainly does not produce ankylosis, but it does prevent it.

Thomas insists that his splints should be made of malleable iron strips, and he claims that steel is unsuitable. My experience with iron bars has been that when a child sits or brings any strain upon them they assume a position of greater flexion than before, and *remain there*. This requires almost daily straightening in order to maintain a proper position. Such bending and straightening disturb and produce motion at the hip-joint. A stiff spring-steel strip will bend no more under force which may be applied; in fact, it does not yield so readily, and it immediately returns to its original position. It can be straightened from time to time by wrenches with perfect ease, as necessity requires, and, in my experience, it is superior to iron, although Thomas's large experience is justly entitled to great weight.

I do not argue against his methods. I only claim that the same results can be obtained in a variety of ways. No individual should be limited to a single splint, for it is not the splint that cures hip disease. Such a result is only to be obtained by the most careful and constant supervision of the various steps of the case in its several stages for many years.

We are to keep constantly in view the prevention, limitation, and reduction of the inflammatory process, while at the same time we so fortify the general health that it may successfully combat and at last throw off the destructive tuberculous process.

As I understand it, all of Mr. Thomas's cases have been in private practice. It is not strange, then, that he should secure good results. This class of cases in our own country will also yield admirable statistics, but in the great crowd of drifting dispensary cases, where any form of treatment is given but a small chance of success from the neglect of even simple directions, it is not strange that most direful results are seen. I have often seen cases where even the plainest injunctions have been absolutely disregarded, and yet the surgeon or the plan of treatment has been compelled to bear the blame of failure.